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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,702	04/28/2006	Masao Yanagawa	023174-0161	3178

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EXAMINER	
LEE, RIP A	

ART UNIT	PAPER NUMBER
1796	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,702	YANAGAWA ET AL.	
	Examiner	Art Unit	
	Rip A. Lee	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7 and 9-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 7 and 9-25* is/are rejected.

7)☒ Claim(s) *7 and 8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *01-03-2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action follows a response filed on November 8, 2007. Claims 1 and 10 were amended. New claims 20-25 were added, and claims 2-6 and 8 were canceled. Claims 1, 7, and 9-25 are pending.

Claim Objections

1. Claims 7 and 8 are objected to because of the following informalities: Please replace "tantalum compound" with "tantalum halide" so that claim language is consistent with that in the independent claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102 / Claim Rejections 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Murray (U.S. 6,320,005).

Example 10, Table 4, entries 9f of Murray shows preparation of a catalyst comprising modified MAO (MMAO) and a tantalum halide complex prepared from the pyridylamine ligand in column 27 and $TaCl_5$. The resulting tantalum complex has the general formula $LTaCl_4$ or L_2TaCl_3, and although the metal complex is not a homoleptic tantalum halide, such as $TaCl_5$, the resulting metal complex still meets the general description "tantalum halide" since it contains halide ligands. Entry 9n shows a catalyst comprised of the same metal complex and triisobutylaluminum (TIBA).

4. Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Sangokoya *et al.* (U.S. 7,193,100).

The prior art of Sangokoya *et al.* discloses modified aluminoxanes prepared by halogenating methylaluminoxane (MAO); see examples. Catalysts are prepared by contacting modified aluminoxanes with a transition metal complex. Useful transition metal compounds are listed in col. 21-23. Sangokoya *et al.* recites $TaCl_5$, $TaBr_5$, and TaF_5 in col. 22, lines 65. When a species is clearly named, the species claim is anticipated no matter how many other species are additionally named. The comprehensiveness of the listing does not negate the fact that the compound claimed is specifically taught. *Ex parte A*, 17 USPQ2d 1716 (BPAI 1990).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

5. Claims 7 and 10-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sangokoya *et al.* (U.S. 7,193,100) in view of Sen *et al.* (U.S. 6,344,594).

The discussion of the disclosures of the prior art from the previous paragraph of this office action is incorporated here by reference. Sangokoya *et al.* does not disclose trimerization of olefins. The prior art of Sen *et al.* discloses the contact product of $TaCl_5$ and MAO as an effective catalyst for selective trimerization of ethylene. One having ordinary skill in the art would recognize the similarity between the $TaCl_5$/MAO catalyst system of Sen *et al.* and the $TaCl_5$/modified MAO system of Sangokoya *et al.* And although Sangokoya *et al.* is more intending use of catalyst for olefin polymerization, one having ordinary skill in the art would recognize that $TaCl_5$/modified MAO system of Sangokoya *et al.* would not be well suited for high yield olefin polymerization. However, the combination of teachings would have suggested to one having ordinary skill in the art that $TaCl_5$/modified MAO finds better use as an ethylene trimerization catalyst. Accordingly, it would have been obvious to one having ordinary skill in the art to prepareuse $TaCl_5$/modified MAO system of Sangokoya *et al.* in a process of ethylene trimerization, and since Sen *et al.* shows that a similar catalyst is effective for this purpose, one having ordinary skill in the art would have reasonably expected the catalyst of Sangokoya *et al.*

to exhibit good activity toward ethylene trimerization. In summary, it would have been obvious to one having ordinary skill in the art to carry out the process of claims 10, 18, 19, 22, 23, and 25 from the combination of teachings of Sangokoya *et al.* and Sen *et al.*

The subject matter of claims 7 and 24 are obvious over Sen *et al.* The reference teaches use of 0.25 to 10, and preferably 0.25 to about 2, equivalents of alkylating component (col. 2, lines 25-30), and one having ordinary skill in the art would have found it obvious to use similar ratio of $TaCl_5$ and modified MAO in catalyst system of Sangokoya *et al.* Sen *et al.* also teaches reaction conditions described in instant claims 11-17 (see col. 2, lines 32-47). The subject matter of claims 21 and 22 are obvious over Sangokoya *et al.*, which also discloses preparation of modified aluminoxane by halogenation of isobutylaluminoxane (claim 9). One having ordinary skill in the art would have reasonbly expected catalysts containing these modified aluminoxanes to work successfully in catalyzing ethylene trimerization.

6. Claims 1, 7, and 9-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sen *et al.* in view of Crapo *et al.* (U.S. 5,041,584), Kaji *et al.* (EP 1 352 913) Dixon *et al.* (U.S. 7,300,904).

Sen *et al.* teaches a process for trimerization of ethylene to 1-hexene in the presence of a catalyst comprising $TaCl_5$ and MAO (col. 2, line 21, example 12). The reference does not disclose use of modified methylaluminoxane or triisobutylaluminoxane. However, at the time the invention was made, modified methylaluminoxanes was well-known and commercially available to those working in the catalyst art; see entirety of Crapo *et al.* Also, Kaji *et al.* discloses that catalysts containing modified methylaluminoxanes exhibit higher activity compared with similar catalysts containing standard methylaluminoxane (abstract). In fact, aluminoxanes prepared from trimethylaluminum, triisobutylaluminum, or a combination of trialkylaluminums are routinely used in trimerization processes, see Dixon *et al.*, col. 5, lines 17-28. The collective teachings would have suggested to one having ordinary skill in the art that aluminoxane prepared from triisobutylaluminoxane, or a modified aluminoxane, prepared from a combination of trimethylaluminum and triisobutylaluminum are effective co-catalysts for making active ethylene trimerization catalysts. Thus, it would have been obvious to one having ordinary skill in the art to use modified MAO or triisobutylaluminoxane as the co-catalyst

component in the catalyst disclosed in Sen *et al.*, with the reasonable expectation that such a modification would lead to catalyst that exhibits higher activity. In summary, it would have been obvious to one having ordinary skill in the art to make the catalyst of instant claims 1 and 9. Since Sen *et al.* teaches use of 0.25 to 10, and preferably 0.25 to about 2, equivalents of alkylating component (col. 2, lines 25-30), one having ordinary skill in the art would have found it obvious to use similar ratio of $TaCl_5$ and modified MAO or triisobutylaluminoxane.

One having ordinary skill in the art would have found it obvious to use the modified catalyst, described in the previous paragraph, in the trimerization process of instant claims 10-25, since Sen *et al.* clearly teaches this particular application. Practical reaction conditions are disclosed fully in column 2, lines 32-47.

7. Claims 10-19, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khotimskii *et al.* (SU 1690365) in view of Andes *et al.* (*J. Am. Chem. Soc.*, 2001).

Khotimskii *et al.* teaches a catalyst comprising the contact product of equimolar quantities (0.54 mole) of $TaCl_5$ and *sec*-BuLi (Table 1, entry 7). Other catalysts are prepared using isomeric *n*-BuLi and *t*-BuLi. The catalysts in Khotimskii *et al.* were shown to be effective catalysts for polymerization of 1-Me_3Si-1-propyne. The reference does not disclose other uses of these catalysts.

Andes *et al.* teaches a composition comprising the contact product of $TaCl_5$ with *n*-BuLi or *t*-BuLi as an active catalyst for selective trimerization of ethylene to 1-hexene (Table 1, entries 8 and 9). One having ordinary skill in the art, having both references at his disposal, would have recognized that both teach the same catalysts $TaCl_5$/*n*-BuLi and $TaCl_5$/*t*-BuLi. The relevant difference between the two references is use of a catalyst of $TaCl_5$/*sec*-BuLi. However, it would have been obvious to one having ordinary skill in the art to use the $TaCl_5$/*sec*-BuLi catalyst of Khotimskii *et al.* in a process for trimerization of ethylene because Andes *et al.* demonstrates that *n*-BuLi and *t*-BuLi as effective co-catalysts, and therefore, one having ordinary skill in the art would have expected use of isomeric *sec*-BuLi to work in the same capacity. A *prima facie* case of obviousness may be made when chemical compounds have very close structural similarities and similar utilities. An obviousness rejection based on similarity in chemical structure and function entails the motivation of one skilled in the art to make a compound, in the

expectation that compounds similar in structure will have similar properties. *In re Payne*, 606 F.2d 303, 313, 203 USPQ 245, 254 (CCPA 1979). The combination of teachings is especially compelling, and it would have been obvious to one having ordinary skill in the art to combine teachings and arrive at the process recited in instant claims 10, 18, 19, 24, and 25.

The subject matter of remaining claims 11-17 are obvious over the teaching in Andes *et al.* Polymerization conditions are typically carried out in chlorobenzene at a temperature of 45-60 °C using an ethylene pressure of 700 psi (4.8 Mpa); see page 7423, col. 1, paragraph 20. Thus, it would have been obvious to one having ordinary skill in the art to use the reaction conditions prescribed in the prior art because conditions appear to have been optimized to ensure acceptable product yield.

Response to Arguments

8. The rejections of claims under 235 U.S.C. 102(b) as being anticipated by Khotimskii *et al.* (SU 1690365), Oberkirch *et al.* (U.S. 3,719,652), and Valvassori *et al.* (U.S. 3,900,452), set forth in the previous office action of May 9, 2007, have been overcome by amendment. None of the references teaches the claimed catalyst containing a modified methylaluminoxane or isobutylaluminoxane.

Applicant traverses the rejection of claims under 35 U.S.C. 103(a) as being unpatentable over Khotimskii *et al.* (SU 1690365) in view of Andes *et al.* (*J. Am. Chem. Soc.*, 2001). Applicant submits that the specification shows that catalysts of the presently claimed invention are far superior to that of the catalyst of Andes *et al.* Applicant's arguments have been fully considered but they are not persuasive. Applicant has not provided cogent rationale as to why one having ordinary skill in the art would not have found it obvious to use the $TaCl_5$/*sec*-BuLi catalyst of Khotimskii *et al.* in a process for trimerization of ethylene. The examples in the sepcification only show improvement over the $TaCl_5/Me_2Zn$ system described in Andes *et al.*, however, the examples are devoid of any showing of unexpected results using the catalyst system of the closet prior art, in this case, Khotimskii *et al.* In absence of sufficient showing of unobviousness, the rejection has been maintained.

Conclusion

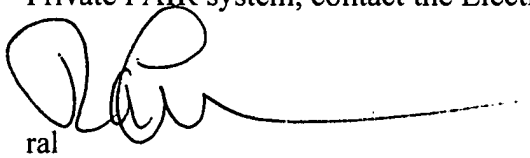
9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu S. Jagannathan, can be reached at (571)272-1119. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).



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January 18, 2008